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U.S. Serial No. 10/813,719 (Attorney Dkt: HALB:051)

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AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

What is claimed is:

1. (Currently amended) A method of distinguishing oil based drilling fluid from subterranean formation fluid hydrocarbons during nuclear magnetic resonance testing while drilling a borehole in the subterranean formation, said method comprising adding paramagnetic species to the drilling fluid and circulating the drilling fluid containing the paramagnetic species in the borehole prior to said testing, wherein the testing comprises logging the borehole and taking nuclear magnetic resonance measurements of the subterranean formation during the logging.
2. (Original) The method of claim 1 wherein said paramagnetic species comprises transition metals, rare earth metals, persistent organic radicals, or combinations thereof, having paramagnetic character.
3. (Original) The method of claim 1 wherein said paramagnetic species comprises Fe^{3+} , Mn^{2+} , Ni^{2+} , and Cu^{2+} , Gd^{3+} , tetramethylpiperdinenyl-1-oxyl ions or combinations thereof.
4. (Currently amended) The method of claim 1 wherein said paramagnetic species are oil soluble or oil solubilized.
- 5.-7. Canceled.
8. (Currently amended) A method of detecting hydrocarbon-bearing zones in a formation penetrated by a borehole drilled with oil-based drilling fluid, said method comprising: adding paramagnetic species to said drilling fluid prior to or during the drilling of said borehole; circulating said fluid comprising the paramagnetic species in said borehole; and following such circulation of said fluid, acquiring nuclear magnetic resonance measurements of at least a portion

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of the formation through said borehole for analyzing the nuclear magnetic resonance spectra from said measurements in determining whether said portion of the formation contains a hydrocarbon bearing zone.

9. (Currently amended) The method of claim 8 wherein said nuclear magnetic resonance measurements are taken during ~~logging-while-drilling~~ logging-while-drilling operations.

10. (Currently amended) The method of claim 8 further comprising taking at least one core sample from the region of said formation at which the nuclear magnetic resonance measurements were taken for analyzing said sample in determining whether said region of the formation contains a hydrocarbon bearing zone.

11. (Currently amended) A method of detecting or identifying characteristics of hydrocarbons in the formation surrounding a borehole drilled with oil-based drilling fluid, said method comprising: adding paramagnetic species to said drilling fluid prior to or during use of the drilling fluid in the drilling of said borehole; circulating said fluid containing the paramagnetic species in said borehole while drilling the borehole; and following such circulation of said fluid, acquiring nuclear magnetic resonance measurements of at least a portion of the formation surrounding the portion of the borehole penetrating the formation drilled using the drilling fluid containing the paramagnetic species, for analyzing the nuclear magnetic resonance measurements to detect or identify characteristics of hydrocarbons in the formation.

12. (Currently amended) The method of claim 11 wherein said nuclear magnetic resonance measurements are taken during ~~logging-while-drilling~~ logging-while-drilling operations.

13. (Currently amended) The method of claim 11 further comprising taking at least one core sample from the region of said formation at which the nuclear magnetic resonance measurements

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were taken for analyzing in detecting or identifying characteristics of hydrocarbons in the formation.

14. (Currently amended) A process of analyzing the fluid composition of a subterranean formation near a borehole drilled with oil-based fluid, said process comprising adding oil soluble or oil solubilized paramagnetic species to said oil-based fluid prior to or during said drilling of the borehole and detecting any filtrate of said drilling fluid containing the paramagnetic species in said formation using nuclear magnetic resonance, wherein said paramagnetic species comprises Fe^{3+} , Mn^{2+} , Cu^{2+} , Gd^{3+} , tetramethylpiperdinenyl-1-oxyl ions, or combinations thereof.

15.-16. Canceled.

17. (Original) The process of claim 14 wherein said analysis is conducted in the laboratory on cores of the formation sampled after said drilling with fluid to which said paramagnetic species were added.

18. (Original) The process of claim 14 wherein said analysis is conducted using measurements taken with a nuclear magnetic resonance tool in said borehole after said drilling with fluid to which said paramagnetic species were added.

19.-21. Canceled.

22. (Withdrawn) A drilling fluid comprising an oil base and paramagnetic species soluble in said base.

23. (Withdrawn) The drilling fluid of claim 22 wherein said oil base is a synthetic oil.

24. (Withdrawn) The drilling fluid of claim 22 wherein said oil base is a natural oil.

25. (Withdrawn) The drilling fluid of claim 22 wherein said paramagnetic species comprises transition metals, rare earth metals, persistent organic radicals, or combinations thereof, having paramagnetic character.

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26. (Withdrawn) The drilling fluid of claim 22 wherein said paramagnetic species comprises Fe^{3+} , Mn^{2+} , Ni^{2+} , and Cu^{2+} , Gd^{3+} , tetramethylpiperdinenyl-1-oxyl ions, or combinations thereof.
27. (Withdrawn) The drilling fluid of claim 22 wherein said paramagnetic species has been formulated to be soluble in oil.
28. (Withdrawn) The drilling fluid of claim 22 wherein said paramagnetic species has been oil solubilized.
29. (Withdrawn) A method of drilling for hydrocarbons, said method comprising using the drilling fluid of claim 22.
30. (Withdrawn) The method of claim 29 further comprising determining the location of said hydrocarbons using nuclear magnetic resonance.
31. (Withdrawn) The method of claim 29 further comprising analyzing the quantity of said hydrocarbons using nuclear magnetic resonance.
32. (Currently amended) A method of drilling a borehole in a subterranean formation, said method comprising: the step of providing using an oil-based drilling fluid comprising paramagnetic species comprising transition metals, rare earth metals, persistent organic radicals, or combinations thereof, having paramagnetic character for use in drilling the borehole; and the step of drilling said borehole using said drilling fluid.
33. (Currently amended) The method of claim 32 wherein said paramagnetic species in said drilling fluid are oil soluble or oil solubilized.
34. Canceled.
35. (Currently amended) The method of claim 32 further comprising the step of logging said formation using a wireline nuclear magnetic resonance tool in said borehole.

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36. (Currently amended) The method of claim 35 further comprising the step of using the logs from said logging to analyze the formation fluids.

37. (Currently amended) The method of claim 32 further comprising the step of taking core samples from said formation.

38. (Currently amended) The method of claim 37 further comprising the step of testing said core samples using nuclear magnetic resonance to analyze the formation fluids.

39. (Withdrawn) A method of preparing an oil-based drilling fluid, said method comprising providing an oil base and paramagnetic species soluble in said base.

40. (Withdrawn) The method of claim 39 wherein said oil base is a synthetic oil.

41. (Withdrawn) The method of claim 39 wherein said oil base is a natural oil.

42. (Withdrawn) The method of claim 39, wherein said paramagnetic species comprises transition metals, rare earth metals, persistent organic radicals, or combinations thereof, having paramagnetic character.

43. (Withdrawn) The method of claim 39 wherein said paramagnetic species comprises Fe^{3+} , Mn^{2+} , Ni^{2+} , and Cu^{2+} , Gd^{3+} , tetramethylpiperdinenyl-1-oxyl ions, or combinations thereof.

44. (Withdrawn) The method of claim 39 wherein said paramagnetic species has been formulated to be soluble in oil.

45. (Withdrawn) The method of claim 39 wherein said paramagnetic species has been oil solubilized.